

NVH/Refinement Measurement & Analysis

Key Benefits

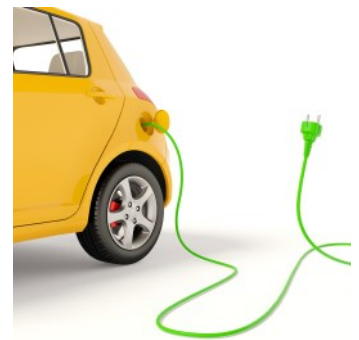
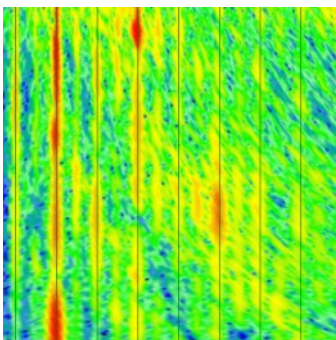
- Fully integrated hardware/software solution
- Waterfalls, orders, tacho analysis, sound quality
- Simple to setup, simple to use
- Portable hardware
- Supports IEPE & voltage inputs
- Comprehensive analysis suite



NVH analysis (Noise, Vibration & Harshness) is central to creating a successful product. It's not just making less noise, but also making the "right" noise, that is important.

Using the depth and power of the DATS NVH Analysis Software, it is possible to measure and refine products from automobiles & aircraft to white goods and other household appliances.

The DATS NVH Analysis Software contains everything an engineer needs for successful NVH analysis.



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NVH/Refinement Measurement & Analysis

The refinement of vehicles and rotating machines with respect to noise and vibration is central to creating a successful product. It's not just making less noise, but also making the "right" noise, that is important.

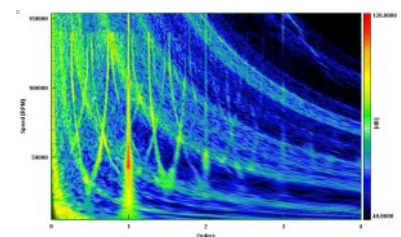
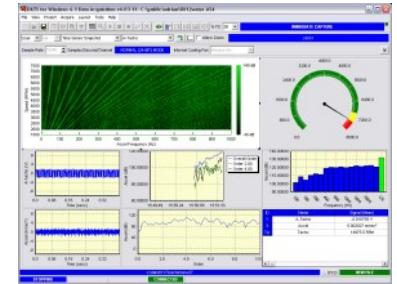
Using the depth and power of the DATS NVH software suite, it is possible to measure and refine the product.

Extensive tacho analysis is used to analyze angular speed. Waterfall and order analysis picks out those parts of the spectrum that are harmonically related. Waterfall averaging enables the engineer to get a more consistent view of the problem. 1/nth Octave Analysis is used extensively as a first level method of reducing the data into standardized bands, which reflect the human response to noise. There are also a large number of Sound Quality metrics, that can be

used to quantify noises in ways that reflect more accurately the psychoacoustic response of the drivers and passengers.

The DATS Sound Quality Audio Replay (SQAR) package allows a user to listen to and analyze audio data. Multiple filtering with combinations of order filters and frequency filters allows detailed investigations and "what if?" analysis. The playlist may include both the original and the modified signals for direct comparison with each other.

In the Time-Frequency Analysis package, a number of different algorithms including Wigner Ville, Atlas Zhao Marks, and Born Jordan, all give slightly different emphasis to features of the signal.



Waterfall Analysis

Speed signal from tacho
Waterfall from tacho signal with phase
Waterfall from speed signal

Order Extraction

Frequency to order spectrum conversion
Order cuts from waterfall

Averaging, Weighting & Octaves

A, B, C, D spectral & time domain weighting
Spectrum averaging
Spectrum average & RMS in user-defined bandwidth
Waterfall averaging
1/nth octave band analysis

Sound Quality Metrics

AI Versus Time
Loudness
• Zwicker Diffuse (ISO532B)
• Zwicker Free (ISO532B)

- Zwicker Diffuse (Vehicle Biased)
- Zwicker Free (Vehicle Biased)
- Stevens (ISO532A)
- Loudness Versus Time
- Speech Articulation Index
- ANSI S3.5 1969
- Vehicle Biased

Composite Rating Performance Value
High Frequency Factor
Preferred Speech Interference Level
Spectral Balance

Misc

Nth Octave from Time
Difference dB Signals (in averaging weighting and octaves)
N10S10 calculation

Time Frequency Analysis

Born-Jordan
Wigner Ville

Zhao Atlas Marks
Mother Wavelet Generation
Wavelet Transforms
Wavelet Reconstruction
Wavelet De-noising
Wavelet Filtering

SQAR Visualizations

Time Histories
Time-Speed Curve
Order Plots
Waterfall Plot
Waterfall Color Map
Sound Quality Metrics
Real-time Speed Readout

SQAR Filters

Order Pass
Order Reject
Butterworth Frequency (Band Pass)
Butterworth Frequency (Band Reject)
Filter Attenuation versus Speed

